WOMEN EMPOWERMENT IN FISHERIES

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WOMEN IN FISHERIES SECTOR AND ENTREPRENEURSHIP DEVELOPMENT: STEPS FOR IMPROVEMENT

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INTRODUCTION

Aquaculture now plays a multi-disciplinary role and aims at providing food security generating employment, economic gains the optimum utilization of resources and finally upliftment of the socio-economical status for those who are directly or indirectly connected with exploitation, production and processing of fish. It has vast potential in providing livelihood security as well as fulfilling the nutritional requirements of the growing population. Traditionally, aquaculture in Southeast Asia has been carried out at the household level with family members often contributing to different activities at specific times. In recent years, it has become a commercial activity and easily accessible in peri-urban areas with access to inputs and markets. Improvement in fish breeding and husbandry technologies, as well as the introduction of new or modified species, mainly through government and non-government organization (NGO) helped in increasing production levels through small-scale rural aquaculture.

The country has observed a steady improvement in freshwater aquaculture, which has made it possible to get a breakthrough in production of more than 15,000 kg. fish/ha/annum from controlled small stagnant freshwater, viz. ponds and tanks, through rational utilization of productivity of various nitches of water column. It has now been realized that more production and income can be generated per unit area of water than the same unit area of land surface, since production in water is three-dimensional. Based on the available nutrient each unit of water support a variety of primary and secondary production, which through judicial cropping and introduction of suitable species of fish can be converted into high quality digestible fish flesh having rich protein and nutritive value. Rate of conversion of food to flesh in fish is more than the goats or pigs and cattle. The resultant impact of propagation of pisciculture through transfer of technology from Lab to Land by both at State and Central Govt level has raised the status of pisciculture to an industry (Table 1). As a result of this, the demand of fish/prawn seed, which is the basic input for culture

activity, has increased many folds. However, a limitating factor in India is that the indigenous commercial varieties of fishes do not generally breed in captivity and artificial methods have to be resorted to.

WOMEN'S INVOLVEMENT IN FISHERIES SECTOR

Fish and fish products are an integral part of the diet of many cultures and are an important economic enterprise and women are active in both artisan fisheries and the commercial fishery sectors. Their activities range from shallow water fishing in artisan fisheries to waged labour in the commercial fishery sector. In such a wide range of activities women are important contributors to both national and household food security while their labour adds to the foreign earnings of the countries. In parts of India, women net prawns from backwaters. In Laos, women fish in canals. In the Philippines, women fish from canoes in coastal lagoons (F AO, 1987). In reviewing the contribution of women in the Bay of Bengal region, Madhu (1989) identifies the diversity of women's roles in the fishery sector "apart from the activities as wife, mother and homemaker (which engage them from dawn to dusk) fisherwomen market fish as retailers, auctioneers or as agents of merchants; make and repair nets; collect prawn seeds or fish seeds from backwaters to supply fish farmers; work as labourers for shrimp processing firms; dry and salt fish; and prepare a variety of fish products". National initiatives to support women's productive activities in fisheries and aquaculture are supported by developing comprehensive household and community food security programmes.

Table 1. Fish production obtained and demonstrated under different technologies under Lab to Land Programme

Sl. No.	Technology adopted	Maximum production obtained
1.	Composite fish culture	6626 kg/ha/yr
2.	Magur culture	3260 kg/ha/8 months
3.	Monoculture of P. *monodon*	476 kg/ha/ 4 months
4.	Monoculture of P. *indicus*	374 kg/ha/3½ months
5	Polyculture of brackish water fish	2240 kg/ha/11 months
	and prawn	Paddy 4976 kg/ha/ yr
	i) Paddy-cum-fish farming	Fish 1107 /kg/ha/yr
	ii) Duck-cum-fish farming	Fish 3500 kg/ha/ yr
	ill) Pig-cum-fish farming	Fish 4600 kg/ha/ yr

In the fisheries sector, participation by women shows up only after landing of the catch. This may be a tradition evolved around need for rest and relief for the menfolk after long spell of hard toil in the water. Till a decade back fish retailing has been mainly women's domain all over the country, both in the inland and marine sectors. In the coastal belts,

after the fish haul, fisherwomen lend a big hand in sorting, grading, processing etc. and constitute a substantial work force in the export-oriented marine products processing units. Women are also involved in processing of water products, viz. high cost aquatic nut, 'Makhana' grown in swampy ponds of North Bihar as they are conspicuous by their total non-involvement in fish farming and rearing activities. But in all fairness to them, fish - farming till recently constituted nothing more than alternate rituals of release of fish seed in the pond, followed by netting operations when the fish grow to a size acceptable to the market. With no involvement in other cultivation inputs or farming husbandry so long, women have actually not felt pond production there is now growing awareness about the need of other input components including water quality monitoring besides, seed release and harvesting. Between lab and field a composite package of technology has not gone home to fishpond farmers in the rural sector, except in some pockets. No doubt it is a reflection on poor extension coverage in this sector. Even continuous motivational efforts go vain more often than not because fish farming in rural sector is still considered as an activity of side income only and not meriting much diversion of presence for application of inputs and other matters of fish culture husbandry. Here lies the vacuum to be filled in by the female members in the household of fish farmers. Leaving the components needing higher physical labour, like bulk transport of inputs including seeds and netting operations which would be occasional, the other routine husbandry matters like regular applications of supplementary feeds, top dress manuring, intermittent checking of water quality etc. can very well be attended to by the women members. These additional components of fish cultural husbandry can very conservatively augment fish production from rural ponds considerably, thereby substantially helping the rural economy. Some of the aquaculture sectors where women can play effective role are highlighted.

Aquaculture in Ponds Integrated with Livestock and Agriculture

Women can undertake indoor jobs like milking, feeding, cleaning etc. with management of male animals and fodder production. However, training and extension programme are by and large not designed to include women. They are ignorant about several issues such as increasing the productivity of animals. In many cooperative societies, the membership is in the name of men and women cannot be paid although the milk is delivered by women. Appropriate technologies for farmwomen in livestock production include milk production technologies such as crossbreeding and improvement of breeds, urea treatment of straws, animal care and management technologies, reproduction technologies such as health and fodder production, milk processing and marketing of milk products, integration of milk production and other production systems, goat and wool production technologies, poultry and rabbit production technologies. Thus livestock enterprises with appropriate production technologies offer immense potential for social transformation of rural women's lives. They will help to strengthen both nutrition and livelihood security at the household level. With per capita land availability in the farming sector constantly declining, judicious utilization of the pond embankments is demand of the time. For the ponds within their manageable reach, rural women can participate in upkeep of the animals being reared on

the embankments or plants under cultivation, also lending hand to aspects of the pond fish culture integrated with livestock rearing and horticultural cultivation on the banks of the ponds.

Fresh Water Pearl Culture

Freshwater pearl culture is a diversified activity in aqual-farming systems. It is a nascent technology developed at Central Institute of Freshwater Aquaculture, Bhubaneswar. The three identified pearl mussel species are *Lamellidens marginalis*, L. *corrianus* and *Parreysia corrugata*. Through three types of surgical procedures, different varieties of pearls are cultured. Presently, the technology has attracted several rural, artisan and enterprising communities including women. This is a skill based technology and is associated with several ancillary activities like pearl mussel, collection, culture unit and culture platform preparation, surgical implantation and post operation care, nucleus preparation and supply, harvest of pearl and pearl processing etc. The technology is gaining importance because of operational easiness, eco-friendly nature, employment and economy generation, local natural resource utilization and can also achieve long term perspective like import substitution and export earnings. For sustenance of this technology the talent and skill of the women need to be exploited to perform the following ancillary activities necessary to initiate a pilot or a commercial project. The production of pearls from freshwater mussels has been picked up by women in some parts of the country, out these mussels from shallow ponds for extracting out the edible parts and also for lime production from the shells. Selected group of women can be taught the art of pearl culture for alternative source of income.

Backyard Ornamental Fish Culture

The backyard small-scale ornamental fish culture enterprise is relatively stable. Practice of ornamental fish culture is claimed to be a lucrative business by women in remote villages, generally willing to adopt innovations to consider economically advantageous. The enterprise like this backyard ornamental fish culture etc. do not add to their drudgery because as it is convenient to operate. Due to inadequate family income farmers cannot afford to take risks. The returns on innovation should be high to offset risk associated with its adoption and the extra labour required. Ornamental fish culture is flourishing as it realized a hobby, it can become a profitable business, as uneducated people can be trained in culture techniques to achieve low cost production. The Government of Bangkok has graded its ornamental fish culture industry as a cottage industry and encourages individual farmers to take up aquarium fish culture alongside agriculture or during off-season. Ornamental fish culture has been ventured among the landless rural women for additional supplementary income. The women are provided with livebearers of fishes such as Guppy, Platy, Molly and Swordtail. The rural landless women can earn an average of Rs. 300-500/- as an additional supplementary monthly income. A local women fish-grower's self-help group has been formed to manage the feed, the marketing issues in order to attain the scale advantage. The local group has also advised to support more women in breeding ornamental fish through

credit facilities. By providing breeding techniques, information on the feed used, method and frequency of feeding, water exchange particulars, growth rate, fecundity, mortality, hatching rate, marketing particulars and the time spent by each women in each activity were imparted. After several hand-on training programmes, the women, confident of themselves started managing and gradually marketing also. Brood fishes. of guppy, platy and molly were procured from CIFA and stocked @ 10 pairs per tank. Women were advised to keep close vigilance on the development of brood fishes, and fry production and to scoop out the fries everyday. The fries so collected were reared in separate tanks for two months to attain marketable size. The on-farm research launched shown the capability of women in learning and adopting the technologies of ornamental fish production in a rural environment. Women groups have been linked to the aquarium fish shops for assured marketing. Success of these units very well proves the potential of ornamental fish production as a good source of income for the rural women. As ornamental fish are delicate, semi-intensive or intensive culture methods are the most suitable. At present, most ornamentals fish are grown indoors in cement grass or earth tanks. The economics and profitability of an ornamental fish-exporting unit has been worked out by MPEDA. Ornamental fish production would be women friendly and profitable enterprise. New opportunities recently created in ornamental fish culture and collection of seaweed practices have recently been introduced. The College of Fisheries, Ratnagiri and the Central Institute of Fisheries Education, Mumbai have been training the women in ornamental fish culture and also in preparation of fish feed for ornamental fish and shrimp. These activities have been identified for further propagation in the Khar Lands schemes in Maharashtra State.

Integrated Aqua Farming

There is vast scope for improving inland fish production through modem aquaculture techniques. The availability of seed and feed become a major constraint in spreading aquaculture techniques. Women entrepreneurs can play an important role and can be trained in induced breeding techniques and in fish seed production. Appropriate production models for freshwater prawn culture that are environmentally safe and economically sound have been demonstrated to women self help groups (SHGs) through participatory approach. Freshwater prawn a low external input sustainable aquaculture was adopted in prawn farming with adequate management measures using farm-produced diets incorporating local ingredients and compatible environmental parameters reported a prawn yield of 1 tonne/ha/ culture in 6 months through adoption of polyculture approach, in addition to fish yields. Integrated farming approach with cattle, poultry, piggery, turkey and duck along with paddy-cum-fish culture was found economically viable and eco-friendly. Technology development and dissemination of water harvest from Northeast monsoon and rainwater, application of organic fertilizers and absence of chemicals and antibiotics with zero water exchange has been a sound technology package for the women entrepreneurs. Women from hilly areas from the villages of Kangra District in Himachal Pradesh were trained in complete package of aqua-farming including soil testing, procurement of fries of grass carp and silver carp and their rearing up to fingerling stage and benefited in sustained income generating activities.

Community Pond Aquaculture

In coastal areas, there are a large number of small and backyard ponds being used for bathing, washing and also as dumping ground, creating environmental problems. Recognizing that women could be employed in making use of such neglected water bodies for raising short term crops of fish fry, fingerlings and even table size fish at very low operational costs, planned to demonstrate the practical feasibility and the range of benefits in terms of economic gains, labour efficiency, self-employment opportunity and multiple choice of vocations that aquaculture could offer to rural women. Besides, providing an opportunity for gainful employment, this programme would also help to meet the protein requirements and improved sanitation and environmental conditions for women empowerment. Community ponds are very closely associated with the tradition and culture of local communities. It is aimed to enhance the production potential of these ponds, by introducing fingerlings of fast growing compatible species of fishes with different feeding habits. Indian Major Carps such as *Catla catla* (Catla), *Labeo rohita* (Rohu) and *Cirrhinus mrigala* (Mrigal) and Exotic Carps such as Silver carp, Common carp, Grass carp and freshwater prawn are stocked together. A stocking density of 5000 - 10000 fingerlings per hectare is commonly followed for all culture operations (Fig. 1).

Fig. 1. Women testing plankton and water quality in culture pond.

Depending upon the factors such as the fertility of the medium, level of feeding, availability of fingerlings and above all the, hands-on experience of the local community, the stocking percentages of the different species may be calculated for the successive operations. Production of 2 ton/ha/culture has been attained in the community pond culture under the zero water exchange conditions, with no supplementary feed. The harvest has been carried out only through related netting since it is not affordable to drain the harvested rainwater. With the implementation of such programme, women can be trained in composite culture, fish farming with agriculture and livestock. This culture practice stresses the importance of maximum utilization of natural resources thereby reducing the dependency on off-farm resources by the local farmers. This type of culture includes a series of agricultural components such as banana and grams, vegetable and horticulture crops on the bund area of the aquaculture farm and has several advantages such as maximizing the land utility area, saving of labour cost towards weeding and supplementary feed, besides providing additional income through enhanced crop yield. The farmers achieve diversified harvest such as fish and rice through water harvesting, vegetables and fruits through cultivation on bunds. Besides, mushroom culture, bio-pesticide production ventures such as culturing *Trichogramma sp.* and kitchen garden can be effectively linked to backyard ornamental fish breeding and community pond management. Thus the intensification of the activities in and around the ponds in a sustainable manner can help in building livelihood opportunities for rural poor women.

Freshwater Prawn Culture (Macrobrachium rosenbergii)

The programme follows the principles of Low External Input Sustainable Aquaculture (LEISA). The freshwater prawn, *Macrobrachium rosenbergii,* commonly called as 'scampi', is one of the major candidate species for freshwater aquaculture. Despite the decline in capture, there tends to be an upsurge of economic interest in augmenting the production in freshwater prawn culture. The unique features of freshwater prawn, such as the large size, coupled with fast growth rate even without a specified feed, inherent nature of being culturable both in fresh and low saline waters, lesser disease outbreaks and possibility of being cultured in polyculture methods, offer economic scope as far as the suitability of the species is concerned. The programme focuses on enhancing the skill of women participants. The participants are encouraged to train the farmers of the neighborhood villages and have been involved in stocking, feed preparation and management.

Paddy-Cum-Fish Culture

Paddy-cum-fish culture is only a co-activity of agricultural operation, in which the drained out water from the paddy farming is being prudentially utilized for fish farming. A rectangular trench ranging from 20 to 100 m^2 in size with a water depth of about 1.8 m and 1.5 m width is used for the culture of carps. The culture of common carps exclusively has already been proved successful. Results show that the water flow into these systems should

be maintained properly and it is desirable to have a constant water flow throughout the culture period in order to get maximum benefit out of it as an additional income. Women plays major role in agriculture, particularly in paddy cultivation operations such as transplanting, weeding and harvesting. The introduction of the fish culture in paddy cultivation can enhance the labour absorption potentials of women, during post-harvesting and marketing.

Technology Intervention in Seed Collection

In West Bengal, seed collection from nature is an activity that provides self-employment to a large number of men and women. Konkan coast is rich in seed availability of a number of commercially important species. Women can be trained in seed collection of mullets, mainly *Liza parsia.* Supply of trash fish for culture of jitada, *Lates calcarifer,* and crabs are other areas that could engage them profitably. Both common carps, *Cyprinus carpio* and java puti, *Puntius javanicus,* are pond breeding in habit and their spawn production is thus very simple and can be adopted in project area. Though the seed of giant freshwater prawn, *Macrobrachium resenbergii* is available in Maharashtra, it is restricted to the northern Konkan region. It is likely that pollution loads in these creeks may soon or later affect its availability. It is therefore, proposed to establish backyard hatcheries which could be a source of income for the family. It would be possible for women to attend to the rearing of the larval stages along with their household chores.

Fattening of Crabs, Mussel and Oyster Culture

Crabs *(Portunus pelagicus* and P. *sanguinolentus)* are a high value resource abundant in the region. The small crab fetches only Rs. 5/- each but the larger one as much as Rs. 200/-. The time taken to fatten them is about three months. The crabs can be fattened in cages installed in the creek and fed on either offal or molluscan meat. Trash fish collected from the creek also could be used. The infrastructure costs are very low and profits sufficiently high. Rocky coasts and sandy beaches along the Konkan coast abound in mussels and oysters suggesting the suitability of these sites for their culture. The technology of mussel and oyster culture is now available and to begin with would be propagated at selected sites through Group Management and Women's Cooperatives (Fig. 2 and 3). Wherever possible, these would also be cultured in shrimp ponds where they would act as bio-filters and reducing the level of suspended solids. This would also lead to enhanced income.

Post Harvest Processing and Value Addition

Opportunities already existing and being exploited in fish processing industries. The industries are located in cities like Mumbai or Ratnagiri; because women folks are employed as low paid employment. Most of the women employed in these plants are from outside the

Fig. 2. Mussel seeding activity by women group

Fig. 3. Seeding of mussel rope for sea farming

State. However, there are tremendous opportunities for self-employment, especially at the landing centre and around the creeks where either large quantities of fish are landed or there is abundance of oysters, mussels and clam beds, which are traditionally exploited by women. At the landing centres, women predominate taking charge of handling of catches. Marketing of fish and shellfish is almost the sole province of women in Konkan region. While 65% of the landings are sold fresh by women, certain species of fish and surplus catches are dried or salted. Since 33% of the fish is processed and 2% salted, which also provide sufficient employment for women in the Konkan region. Production of mango pickle, *papad* and *cocum* syrup are almost household activities in Ratnagiri and Sindhudurg districts, both on as an individual and cooperative basis. Simple technologies to prepare prawn pickle and fish wafers are available and some cooperatives are already involved in production and marketing of these products organisation of training programmes to transfer the technologies would help of the women cooperatives or Mahila Mandals involved in production and marketing.

Credit Options & Microplanning

Involving womenfolk in aquacultural programmes is beset with a few problems. The prominent among them are the credit facilities to be made available to the rural womenfolk through flexible and innovative procedures so that it reaches in the hands of the poorest of the poor. The issues of credit options for micro enterprises in aquaculture for women are very enterprising, as has been observed as a major constraint by many. In India, certain success stories of micro credit through self-help groups (SHGs) report from the State of Tamil Nadu in India, where numerous experiences of women have been cited in successful adoption of micro credit activities in various aquaculture activities. The efforts are worth replicating, where women's role in coastal fisheries is being marginalized and food security for the poor is being threatened. There is a growing recognition that the sustainable development of any economic activity would not be possible unless women are involved in planning and decision making process and made equal partners in managing and controlling the resources. The rural poor have two assets - time and labour. It is hoped that adding value to the two assets would lead to livelihood security. M.S. Swaminathan Research Foundation has been playing a catalytic role in promoting a job-led economic growth that is ecologically sustainable in rural areas and particularly in agricultural sector. It strives to develop, demonstrate and disseminate rural technologies by virtue of its pro-nature, pro-poor and pro-women approach towards sustainable livelihood. The women plays major role in the collection of wild seed, pond construction and post harvest activities. Their role is limited in the activities such as stocking, feeding and seed preparation. The programme makes efforts to fill the gap by providing technological skill and training to rural women. The eco-aquaculture programme demonstrated the economic feasibility and environmental sustainability. The women's eco-aquaculture movement is based on a self-replicating social mobilization process and aims at strengthening the role of women in aquaculture.

TRAINING, DEMONSTRATION AND TECHNOLOGY TRANSFER

In rural areas fish culture and fish seed production generate self-employment, wealth and protein rich food. Aquaculture programmes are gaining popularity with the agriculturists in areas where lands are water logged. The landless labour and tribal people, who live around the reservoirs, have taken to fishing and fish marketing as to get optimum production from the unit water area by providing manpower training and making available quality fish seed in rural areas at the desired time and place. The response of the rural people for fisheries development has been encouraging in many states like Andhra Pradesh, Madhya Pradesh and Haryana, in which women's contribution is enormous. "On the job training" through intensive short-term training courses for the farmers, supported by field demonstration of new technologies helps the farmers in scientific management practices in aquaculture. Groups of farmers, entrepreneurs, educated unemployed or the youth after the training undertake fish seed production starting from handling of the brooder till the fry is reared for sale. Such training programmes help the villagers in locating the land, arranging finance from banks or other sources and within a period of 4 to 5 months, convert their low-lying areas into fish seed farms, and start fish seed production. This approach builds self-confidence amongst the farmers. Fishermen and operators become available in the next season to the private entrepreneurs to undertake fish seed production. Fish Seed Farms established in Andhra Pradesh helped farmers in earning more than Rs. 50,000 per hectare per year, which is many times more as compared to income from paddy cultivation, normally does not exceed Rs. 12,000 per hectare per year. Now the technology of fish seed production has been extended to all the states in the country. Similar training programmes in other states are also being undertaken in Maharashtra, Tamil Nadu and Rajasthan. Scheme of fish seed production, and required accessories can be fabricated in the village and the technology is extremely simple and low cost. The technology also provides better living conditions to the farmers. The technology is built around the welfare of farmers who construct a thatched house for him on the farm itself. They also keep cows to get milk for the family and cows get grass from the farm and provide. dung, which serves as manure for the fish farm. The farmers by soil and water level management divide fish farms between paddy culture and fish culture. On the embankments they grow vegetables like ladies fingers, tomatoes, pulses, fruit plants like coconut, papaya, banana etc. Some fishermen also keep duck and poultry. This quick transfer of technology of "Fish based mixed farming system" has brought about a new way of life for the rural women folk and increases fish production and prosperity in rural areas.

IMPACT ON WOMEN'S LIFE THROUGH AWARENESS & EXTENSION PROGRAMME

Aquaculture is an appropriate technology for the rural women, compatible with the physical capacity and general aptitude of rural womenfolk and easy to adopt the highly rewarding in economic terms. There is only marginal need for investment capital and diminutive demand on the labour time. The aquaculture activities can be pursued by the rural womenfolk in convenient leisure time without detriment to their normal vocation and domestic chores.

Even a small backyard pond of 0.01 ha can serve as a resource base to generate a steady income throughout the year. The use of pond embankments for seasonal horticultural crop production was a successful integration in maximizing productivity from a unit area. Aquatic weed-based compost making proved to be highly advantageous for manuring fishponds and crops. This served to marginalize the input costs. The relatively more progressive women participants mastered the breeding technique of common carp. With minimum effort the womenfolk acquired the skills in fishing-net fabrication and net mending. This opened up an easy access to income an indoor activity from wage earning or from marketing of the finished products. It would be easy to motivate rural women to play participatory role in various segments of aquaculture through coordinated efforts between financing bodies, extension agencies under Govt./NGO sectors and social groups chalking out programmes between themselves on practical lines. One or two cycles of guided operations in the field may be enough to instill confidence in the women operatives to continue with the aquacultural programmes on their own. Fish culture in freshwater ponds and other water bodies has enormous potential for income and employment generation for poor farmers, as well as for improving the nutritional status. Inland fishing is widely practiced in several parts of the country by traditional fisher folk, small farmers generally with low productivity and a high degree of dependence on distant non-local sources for fish seed and other inputs. The impact of Science & Technology on society has not been uniformly beneficial but can validate women knowledge and skills arising from their role in food production, traditional healing practices and management of natural resources and the new technologies that can enhance their marketing opportunities and skill. Women in the area of agriculture, environmental resource managements and health hold a substantial amount of local traditional knowledge. Thus, the empowerment of women through fisheries activities had significant impacts and brought about greater awareness to heighten their achievements through the exchange of information and research leads.

AQUACULTURE AS COTTAGE BASED INDUSTRY

An agriculture-fish/ shrimp culture is dominant economy in villages and has enormous scope of improving livelihood and improving agri-horticulture-live stock-aquaculture yields in rural sector. Target womenfolk and rural population can be made aware of these opportunities, the Non-Govemment Organization, KVKs, Agricultural Technology Information Centres (ATIC) of ICAR and University and college departments who have involvement with people at grass root level and who can transfer all the technologies by way of training programmes, developing market channels, post-harvest and packing technologies. Establishment of bioparks is some of the entrepreneurship development opportunities given to professionally qualified women for setting up self-employment ventures including fisheries and post harvest activities and product development. There are several such opportunities for exploring and making use of biotechnology in the fields of applications such as development algae for feeds and fertilizers and preparations of raw feeds for aquaculture. Women entrepreneurship in various aspects of aquafarming such as ready-to-market fish preparations, fish/ shrimp seed production and marketing, other managements and cooperatives are being promoted (Fig. 4 to 6). Active involvement of

Fig. 4.
Shrimp feed ingredients for grinding and feed formation

Fig. 5.
Pelletisation of shrimp feed pellets using pelletizer by women group

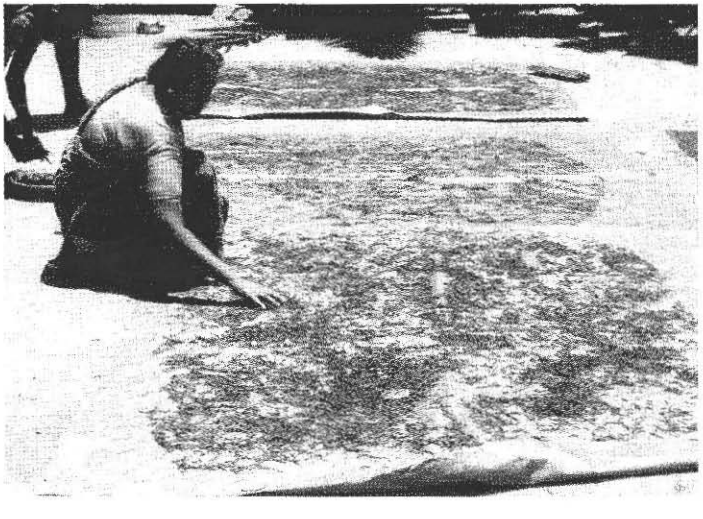

Fig. 6.
Preparation and drying of shrimp feed on polyethene sheet by women folk

women and their organization in natural resource management is the need of the hour to provide education and intensive training for rural women to help in improvement of skills and make them as entrepreneurs to take up a fulltime/ part-time aquaculture as avocation. The cottage level production of fish seeds and feeds are effectively provided simple technology and transferred to equip coastal womenfolk in developing economically feasible, well balanced prawn (fish) feed from locally available raw materials to bring economic prosperity to the people of the region. It could evolve simple technologies for the improvement of traditional methods of shrimp/fish culture with emphasis on the utilization of non-conventional resources such as derelict waters of coconut grove canal systems, reuse of seeds of cultivable fishes lost in the traditional fishing methods and recycling of organic wastes generated in agriculture, fishery and animal husbandry activities. Developing of an appropriate rural technology for the cottage level production and preparation of balanced fish feed by utilizing the locally available ingredients is inexpensive, suitable for utilization of raw materials, mainly from the organic wastes and other non-conventional resources of the villages and transferring the technology to poor rural women for generating employment and for welfare of the rural community. There has been a tremendous achievement in the fisheries sector resulting in fast growth of mechanized fishing fleet, introduction of synthetic fish nets and establishment of several icing and fish processing factories to cater to the export trade, but, the traditional fishing sector especially, the fisherwomen could not utilize the science and technology developed by the R&D institutions due to ignorance and poverty. The technologies developed by such institutions have helped mainly those who came forward with capital investment seeking earning through export. Being very poor and devoid of any special wage earning skills, the women labour force available in the coastal areas is forced to work under substandard conditions in the peeling sheds for preprocessing and processing of fish and other items, and exploited to a great extend by middlemen at very low remuneration.

SUGGESTIONS/FUTURE STRATEGY/AVENUES FOR CHANGE

Women are generally involved in the management of aquaculture in small water bodies such as backyard ponds, but not in large water bodies, e.g. lakes, reservoirs and along the coast. The gender division of labour in these different water bodies seems to have connections with the gender division of labour in fisheries. In many places, fish harvesting is generally carried out by men. For example, in the Philippines, the culture belief that women bring bad luck to boats effectively restricts their involvement in fishing and most mariculture. On the other hand, in small-scale inland aquaculture, women are reasonably active. To ensure better involvement of women in aquaculture development as well as improve the economic condition of women, the following aspects are to be considered:

- To develop active cooperation amongst the R&D institutions, agricultural universities, state governments, fisheries departments and marketing agencies in collaboration with voluntary organizations. aquacultural programmes are largely dependent on availability of fish seed and supply of other essential inputs. Womenfolk involved in aquaculture would naturally have to depend on others in procurement of such essential items often from distant places.

- To ensure facility for quality maintenance, long shelf life and proper storage of diversified fish products.
- To provide financial assistance by relevant agencies to traine women to enable them to form cooperative societies to start their production units.
- A better understanding of the existing gender relations in the community and the household must be gained by institutions/organizations working for the development of aquaculture. Participatory technology development offers more scope to incorporate women's experiences.
- Workshops and meetings should be organized to cultivate awareness on gender equality in the community and among people working for aquaculture development. Successful cases of women's involvement in aquaculture can be emphasized. Aquaculture training and extension efforts should be improved by taking a more holistic approach that encompasses women's time use, household responsibilities, literacy levels, as well as all aspects of their daily chores by offering separate training for men and women to encourage their active participation, by recruiting female extension staff; and by involving women in technology development and technological designs to ensure that these are suited to women's needs and physical capacity in order to facilitate their activities in aquaculture.
- Effective training on need-based technologies before setting up any project is a very important step. While dealing with the womenfolk, particularly from the far off villages, it often becomes problematic to organize their on-campus training programme. Under such situations, the training programmes have to be organized at the village itself with very limited scope for practical demonstrations.
- Extension programmes launched for the womenfolk in rural areas are often very difficult to manage unless there is a well-versed lady in between to act as a negotiator.
- There must be a provision to have greater number of female extension workers in respective fields in order to provide a fillip to the projects, which are exclusively designed for the rural womenfolk.
- Development of indicators to ensure that the involvement of women is monitored on a regular basis so that their activities or participation in aquaculture can be refocused regularly.
- Even though women are the ones who do the retail marketing of fish in many of the Southeast Asian countries, their information on market is limited. A mechanism is necessary to expose women to more extensive market information and to link them to a wider market network.

In modern times, new technologies are changing the nature of jobs and the composition of the workforce. In a progressive society, the relevance of a planned strategy to reach the benefits of science and technology to womenfolk in order to make them equal partners to progress cannot be over emphasized. Considering the contribution of fisheries in international development in providing the primary source of protein to the world population and its impact as a source of income and employment generation to multitudes, this model

can very well be adopted in underdeveloped nations at a global level in utilizing the multi-species of fish for the progress of women, provided proper focus on need based strategies is evolved. The scheme can also be introduced in different maritime and inland states in India for fisheries development.

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